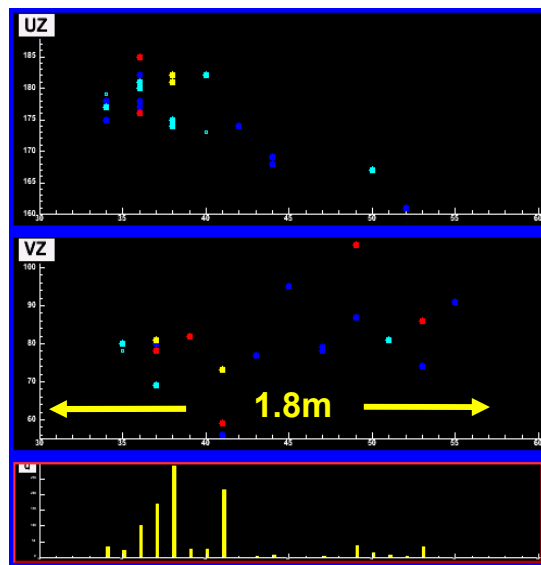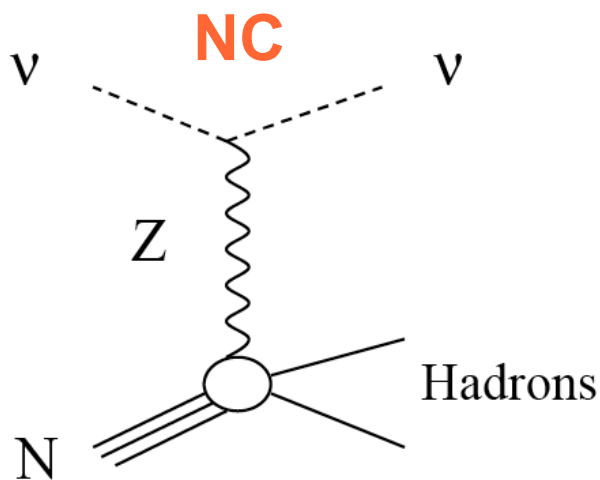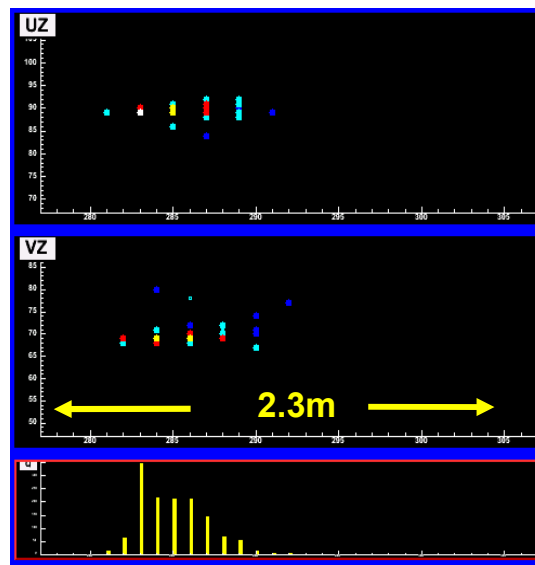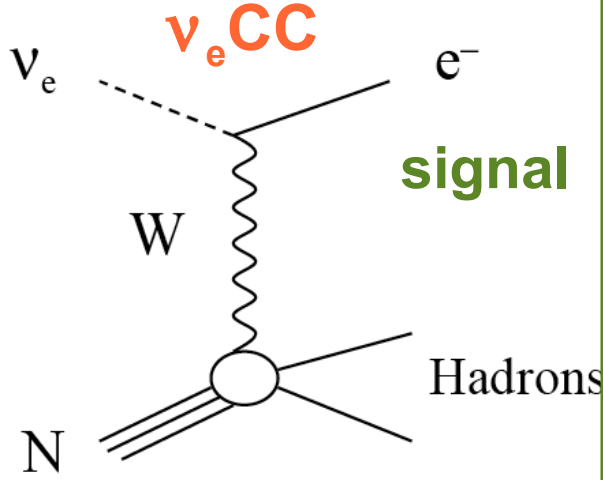# ν_e Appearance in MINOS

$$P(\nu_\mu \to \nu_e) \approx \underline{\sin^2 2\theta_{13}} \sin^2 \theta_{23} \sin^2 \frac{\Delta m_{32}^2 L}{4E}$$
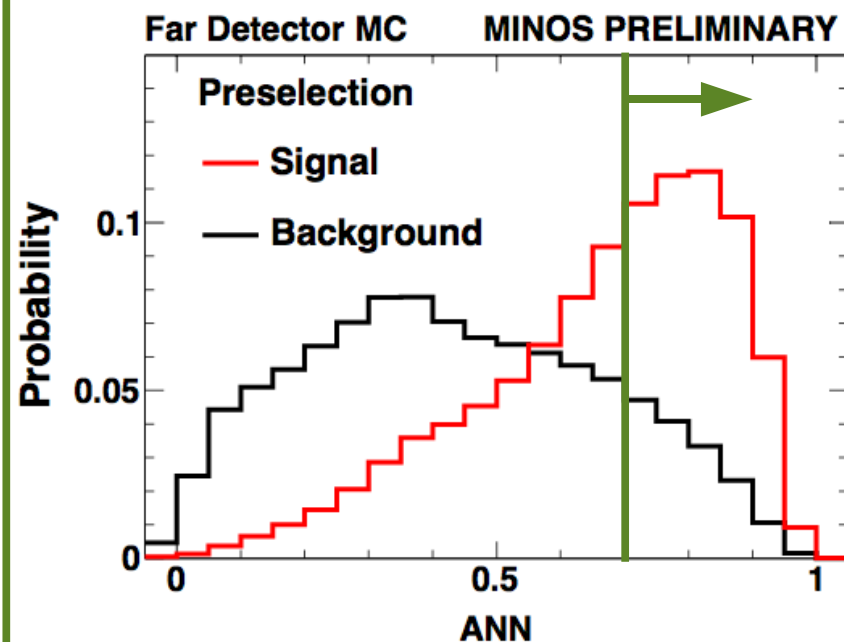
NC

ν_eCC

signal

nue selection variable (ANN):
a neural network based on 11 variables that characterize the shower shape

short event, often diffuse

1.8m

short, with typical EM shower profile

2.3m

Far Detector MC — MINOS PRELIMINARY
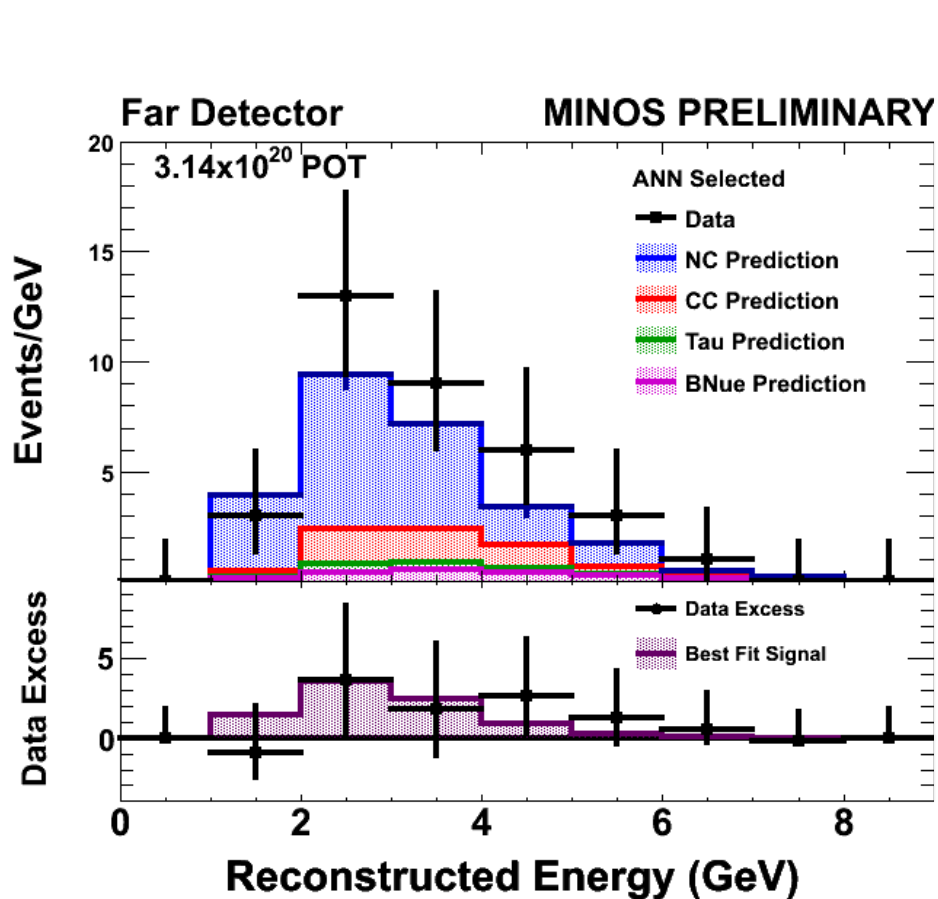
Preselection
— Signal
— Background

Probability

ANN

ν_e Appearance in MINOS

First results: for 3.14e20 protons-on-target (POT)

Observation: 35 events
Expected Background: 27 ± 5(stat) ± 2(syst) events

Paper on this result will be
submitted to PRL soon...
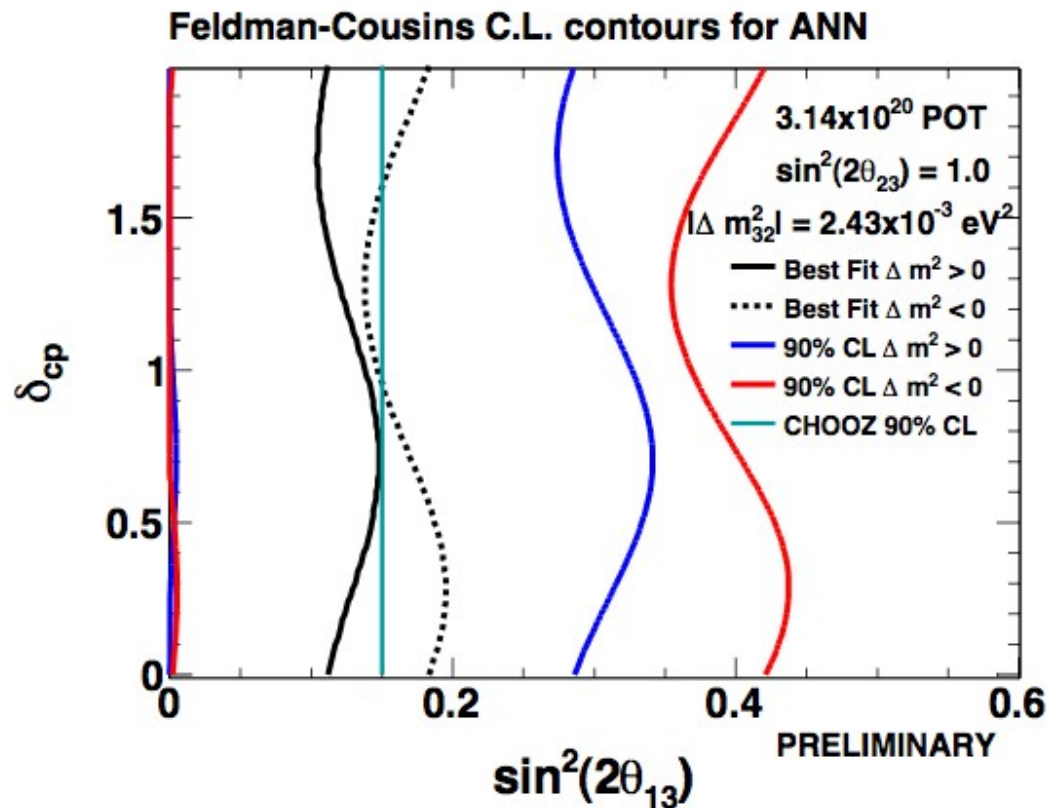
90% CL upper limit on $\sin^2 2\theta_{13}$:

< 0.28-0.34 normal hierarchy
< 0.36-0.42 inverted hierarchy

ν_e Appearance in MINOS: Future

For the next analysis:

7e20 POT – more than double the statistics!

Multi-bin fit (binning in nue selection variable)

Further development of alternate selection method based on matching candidate events to MC library events

Expect results at the beginning of 2010!

increased sensitivity w/ multi-bin fit, plus background constraint

fitting the entire spectrum of the nue selection variable in 4 bins